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DISEASES OF THE NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

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DISEASES of the NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

Intelligence and Language Functions in Dysphasic Patients

RALPH M. REITAN, PH.D.

Indianapolis, Indiana

The role of language in thinking or intelligence has occupied a prominent position of interest for hundreds of years. Speculation, opinions, and conclusions have been offered by experts in such diverse fields as poetry, philosophy, neurophysiology, neurology, semantics, psychology, and speech pathology. Philosophers, by and large, have argued for the notion that thinking and speech are necessarily and perfectly related. Schelling has said, "Without language it is impossible to conceive philosophical, nay, even any human consciousness." Bain comments, "Thinking is restrained speaking and acting," and Ribot, "A thought is a word or an act in a nascent state . . . a commencement of muscular activity." John Stuart Mill carries this notion a little further: "Reasoning, the principal subject of logic, takes place usually by means of words, and in all complicated cases can take place in no other way." Leibniz makes a statement that should be of especial interest to those concerned with rehabilitation of dysphasic patients, "It troubles me greatly to find that I can never acknowledge, discover or prove any truth except by using in my mind words or other signs. . . . If these characters were absent, we should never think or reason distinctly." Turning to poets, Wordsworth has said, "The word is not the dress of thought, but its very incarnation."

A trend in psychology to equate thinking with speech was begun with the behaviorist movement. Such terms as "thinking" and "consciousness" were dropped in an effort to describe behavior in terms of observable and functional aspects. Thinking was largely equated with speech. Neurophysiologists soon added to the evidence for a "peripheral" theory of thinking with their measurements of nerve and muscle potentials which occurred in the absence of voluntary movement but following commands to think about certain subjects.

Neurologists have contributed observations on this problem based primarily on their study of dyphasic patients. They have not been in entire accord, however, with respect to the relation between language and thinking. Many (Hughlings Jackson,[1] Head,[2] Weisenburg and McBride,[3] and others[4]) have tended to feel that intellectual impairment is not an integral aspect of the language difficulties in aphasia while others (Pierre Marie,[5] Kurt Goldstein[6]) have felt that it is. Experimental work has been done on this problem by Meyers,[7] who found that dysphasic brain-damaged patients did no more poorly in certain non-language problem solving situations than did control patients. A recent experiment by Reitan[8] showed no differences on the Rorschach Test between two similar dysphasic and non-dysphasic brain-damaged groups. A control group with no brain-damage did considerably better than

From the Department of Surgery, Indiana University School of Medicine.

the two brain-damaged groups. In these three groups the patients were individually matched on the basis of sex, color, age, education, and vocabulary.

The problem in the present study is to compare the performances of three groups (dysphasic brain-injured, non-dysphasic brain-injured, and control) on a standard measure of psychometric intelligence yielding an Intelligence Quotient (Wechsler Mental Ability Scale).

Case Material

Three groups of 17 men were used. The subjects in each group were matched for color and sex and as closely as possible with respect to chronological age and years of formal education. The dysphasic brain-injured group was composed entirely of right-handed patients who had received left cerebral cortical traumatic damage and had residual dysphasia. The non-dysphasic brain-injured group was also composed entirely of right-handed individuals, but each of these had received right cerebral cortical traumatic injuries and had no aphasic symptoms following injury. The control group members were hospitalized, as were the patients in the other groups, but none of these showed any signs or symptoms of central nervous system organic disease or damage. The members of the control group were in nearly all instances diagnosed as neurotic. The members of the two brain-injured groups were individually matched as closely as possible for severity of injury, making use of all neurologic and neurosurgical case history material as well as examinations during the present hospitalization. The adequacy of matching for severity of brain injury is open to question obviously because of the impossibility of describing each lesion completely. Nevertheless, it was felt that a rough attempt to match the brain injured patients on this variable would be more desirable than to ignore the variable completely.

The importance of matching the individual members of each group with respect to age and education is indicated by the evidence[9] that these factors are related to intelligence. The means and standard deviations in Table 1 indicate the closeness with which the groups were matched. The number of brain-injured patients are also indicated in categories according to the severity of injury.

TABLE 1. *Means and Standard Deviations for Age in Years and Education in Years According to Diagnostic Groups.*

		AGE IN YEARS						EDUCATION IN YEARS					
		Aphasics		*Non-Aphasics*		*Controls*		*Aphasics*		*Non-Aphasics*		*Controls*	
Injury	No.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Severe	3	22.67	2.62	24.33	4.50	23.33	3.09	11.00	0.82	11.00	0.82	10.67	0.94
Moderate	9	25.22	5.01	25.11	6.05	25.11	4.61	11.56	2.67	11.11	2.33	11.67	2.49
Mild	5	26.00	5.14	26.60	3.50	25.40	4.59	11.40	2.25	11.60	2.06	10.80	2.04
Total	17	25.00	4.85	25.41	5.21	24.88	4.43	11.41	2.33	11.23	2.07	11.23	2.21

Procedure

The Wechsler Mental Ability Scale[10] was administered to each of the subjects individually. This test is very similar in content, administration, and scoring to the Wechsler-Bellevue scale for adult intelligence. The examiner had no information regarding diagnostic classification prior to administration of the tests. The tests were completely scored before the groups were composed or the subjects matched on the variables to be equated. Mean scores and standard deviations were calculated for each of the subtests as well as the verbal, performance, and total standard scores. The means of the groups were compared for statistical significance of inter-group differences using Student's t technique.[11]

Results

The means and standard deviations for each group on the Wechsler Mental Ability Scale are presented in Table 2.

TABLE 2. *Distribution Constants for Three Diagnosic Groups on Wechsler Mental Ability Scale.*

	Voc	Inf	Arith	Comp	Sim	Dig. Span	Pict Comp	Pict Arr.	Dig. Sym	Obj Assem	Block Design	V.S.S.	P.S.S.	T.S.S.
Aphasics Mean	11.32	9.88	9.41	9.35	9.59	5.65	10.00	10.06	9.18	10.59	10.23	93.12	99.76	96.24
S.D.	2.75	3.18	4.44	3.69	3.68	3.82	2.47	2.21	1.95	2.30	3.12	29.87	19.63	21.87
Non-Aphasics Mean	12.23	11.94	9.82	10.35	10.94	9.35	8.82	9.88	8.59	10.94	9.29	108.21	92.38	101.70
S.D.	1.90	2.14	2.75	1.57	2.80	2.76	2.62	2.68	2.59	2.67	3.34	20.71	25.49	18.71
Controls Mean	12.44	11.71	10.82	12.06	10.23	8.59	10.76	10.20	10.06	10.82	9.88	109.71	103.64	106.96
S.D.	1.70	1.99	2.83	1.86	2.16	2.93	2.71	1.77	2.62	2.41	3.56	18.95	20.68	18.03

Inspection of Table 2 indicates a marked inter-group consistency with regard to the rank-order of mean values on the verbal subtests (Vocabulary, Information, Arithmetic, Comprehension, Similarities, and Digit Span). The means for the dysphasic patients are consistently below those of the other two groups on these subtests. The means of the non-dysphasic brain-injured patients are much more in line with the control group scores, however. The trend for the dysphasic patients to have lower means disappears on the performance subtests (Picture Completion, Picture Arrangement, Digit Symbol, Object Assembly, and Block Design). These results are more easily observed in a graphic presentation. Figure 1 presents the mean scores for each group in this manner.

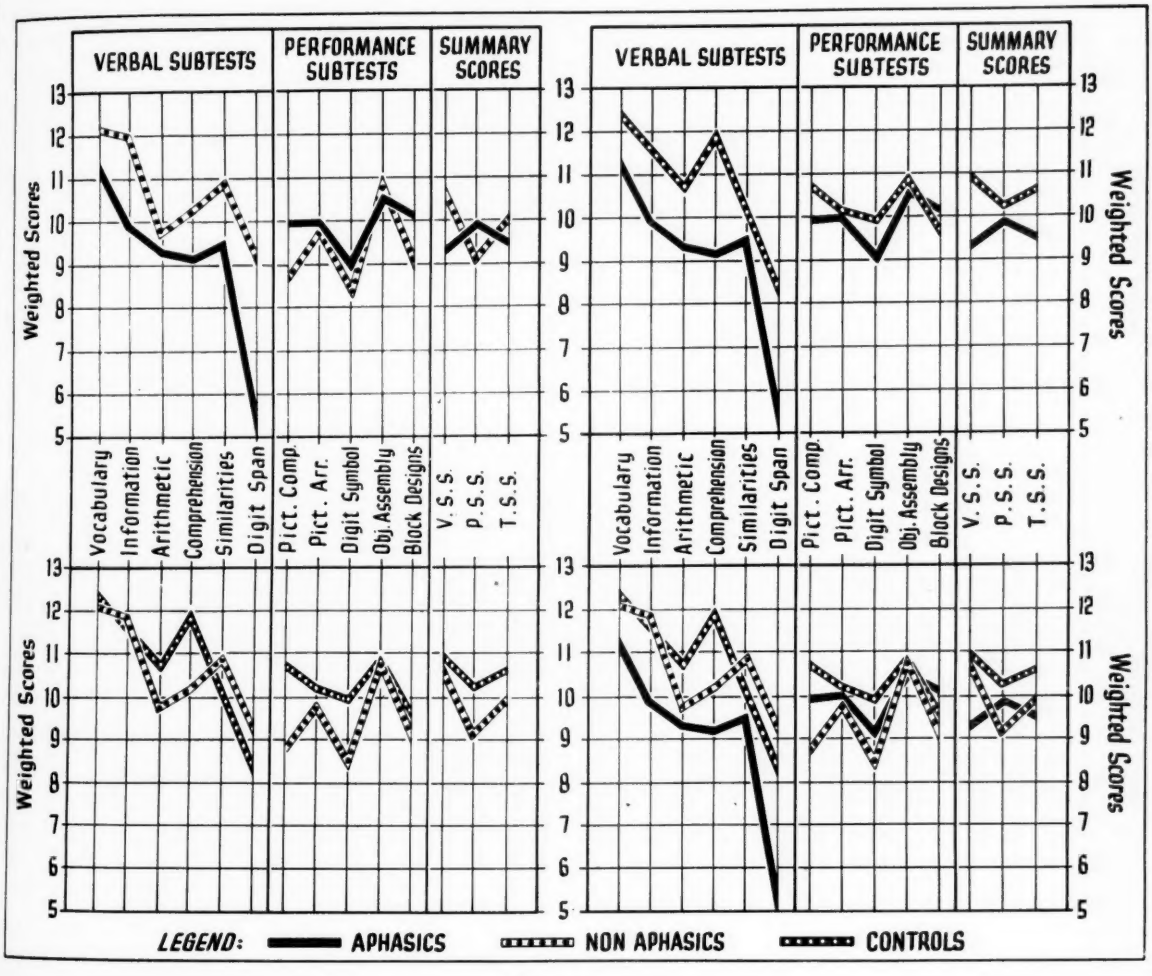

Figure 1.

TABLE 3. *Comparison of Mean Scores by t Ratios on Wechsler Mental Ability Scale for Aphasic, Non-Aphasic, and Control Groups.*

	Voc	Inf	Arith	Comp	Simil	Digit Span	Pict Comp	Pict Arr	Digit Symb	Obj Assem	Block Design	V.S.S.	P.S.S.	T.S.S.
Aphasics vs. Controls	1.75	2.95	1.78	3.71	.69	3.09	.84	.40	1.29	.35	.38	2.87	.80	2.23
Non-Aphasics vs. Controls	.45	.29	1.04	2.90	1.09	.80	2.18	.52	1.60	.12	.53	.28	1.39	.97
Aphasics vs. Non-Aphasics	1.07	1.96	.39	1.12	1.21	3.94	1.42	.21	.87	.51	.85	1.91	1.32	1.02

For ease in comparison, Figure 1 presents a subfigure for each combination of pairs among the three groups and a summary subfigure in the lower right corner. It may be noted that the dysphasic patients are regularly exceeded by the non-dysphasic brain-injured patients on the verbal subtests but that these two groups are approximately equal on the performance subtests (upper left graph). The dysphasics actually scored higher means than the non-dysphasic brain-injured group on four of the five performance subtests, but the differences are probably not large enough to merit emphasis. The control group also exceeded the dysphasic group on the verbal subtests (upper right graph), but again the differences are rather slight on the performance tests. The control group obtained slightly higher means than the nondysphasic brain-injured group generally (lower left graph), but these two groups were more closely equivalent on the verbal than performance subtests. The final three points on each graph indicate the means for the verbal standard score, performance standard score, and total standard score. These summary values bear out the results cited above which indicate that (1) the non-dysphasic brain-injured and control patients do about equally as well on the verbal subtests, but the dysphasic patients do a good deal more poorly, and (2) the two brain-injured groups obtained lower means than the controls on the performance tests, but the non-dysphasics do somewhat less well than the dysphasics.

Although the trends of the above graph indicate some interesting differences in the three groups, it is also of interest to compare the means for the variables individually. The differences between means were tested for statistical significance by Student's t technique for correlated samples, and the t ratios are presented in Table 3.

For sixteen degrees of freedom a t ratio of 2.92 is needed to reach the .01 confidence level, 2.58 for the .02 level, and 2.12 for the .05 level. In comparing the dysphasic brain-injured group with the controls, three of the means on the verbal subtests differed at the .01 level of confidence. The verbal standard score means which summarize the results on the individual verbal subtests, were significantly different at the .02 confidence level. Although the performance standard score means showed no statistically significant differences, the total standard score was sufficiently lowered for the dysphasics by the poor verbal scores to render it significantly different from the controls at the .05 level. The mean differences for these two groups failed to reach significance even at the .05 level on any of the performance subtests. The individual verbal subtests on which the dysphasics obtained significantly lower scores than the controls were Information, Comprehension, and Digit Span. The Information subtest requires the subject to answer questions such as, "What are the four seasons of the year?," "When is Labor Day?," "What is a hieroglyphic?," etc. The Comprehension subtest asks questions such as, "Why is it better to build a house with brick than of wood?," "Why are criminals locked up?," and "Why is cotton fiber used in making cloth?" In administering the Digit Span subtest the examiner reads a series composed of individual digits and the subject is to repeat them. Both forward and backward (reverse order) repetition are used in the subtest. These were the tests on which the dysphasics obtained significantly lower scores than the controls.

In comparing the non-dysphasic brain-injured group with the controls the statistical analysis indicates the differences to be much less striking. One verbal subtest and one performance subtest are significantly lower

for the non-dysphasic group. The Comprehension subtest mean was lower at the .02 level of confidence and the Picture Completion subtest at the .05 level. In the Picture Completion subtest the subject is asked to name the missing part in line-pictures which may be such things as a leg on a table, button holes on a coat, or band on a hat. It is worth noting that the non-dysphasic brain-injured subjects actually obtained a slightly higher (though statistically insignificant) score on the Digit Span subtest than did the controls. Although the Digit Span test has long been an "office standby" for clinical neurologists in attempts to judge the presence of organically impaired psychological functions, the present results as well as others[12] suggest that its validity in this respect is questionable. It was mentioned above that this test did reliably differentiate the dysphasics from the controls, but the obvious language difficulties resulting from brain damage in these patients would have made the test unnecessary.

Comparison of the dysphasic and non-dysphasic brain-injured groups reveals only one statistically significant difference, in spite of the fact that the dysphasics obtained lower mean values on each of the verbal subtests. Only the Digit Span means were significantly different. Although the statistical evidence in the present study does not justify any conclusions of general differences between these two groups, it is safe to hypothesize that if similar results were obtained in extending the groups to larger numbers of subjects, the dysphasics would have significantly lower verbal subtest scores than the non-dysphasics. There appears, however, to be no substantial trend suggesting differentiation of the two groups on the performance subtests.

Discussion

The present study is open to several criticisms. Among the most obvious are the small number of subjects, the impossibility of obtaining sufficiently complete information about the brain lesions in the two brain-damaged groups to have a feeling of confidence that the subjects were closely matched on this variable, and the fact that the groups are certainly not actually equivalent even though a careful attempt was made to match them on relevant variables. Another possible criticism lies in the use of the Wechsler Mental Ability Scale as the measure of intelligence. Although tests of this type have long been used and accepted as measures of intelligence, it is true that the types of subtests included have been selected largely in accordance with a priori notions of the type of behavioral performance which should be considered as intelligent. The reliability and internal consistency of such scales have long been the subjects of intensive effort toward improvement with gratifying results, but we may still question whether items such as word definition, information, digit repetition, arranging blocks to reproduce patterns, etc., are the epitome of intelligence.

It is important to note also that this study is concerned only with a consideration of intelligence measurement in groups differing with respect to organic impairment of language symbolization. The results should not be construed as pertinent to differential functions controlled by one cerebral hemisphere or the other. Each of the brain damaged subjects had received traumatic head injuries from high velocity missiles, and there is evidence in the neurological literature[13,14,15] which indicates that such injuries are rarely, if ever, only focal in nature. The patient material used in this study, then, forbids any application of the results to conclusions regarding cerebral localization. However, the brain damaged groups do differ with respect to residual organic impairment of language symbolization, and may be compared with respect to this variable. With these shortcomings of the experiment in mind we may consider the possible significance of the obtained results, and their relationships to other reports.

The results indicate that dysphasic patients obtain lower scores on certain verbal subtests than do non-dysphasic brain-injured or control patients. In relating this result to the question of the role of intelligence in dysphasia we are faced with alternative explanations. We might accept the results as valid indications and conclude that impairment of verbal intelligence is an integral as-

pect of dysphasia. The alternative is to assume that the dysphasic patients are unfairly penalized by the specific requirements of certain verbal subtests, that these subtests are therefore in part measures of the specific dysphasic difficulties, and that the dysphasic patients are no more impaired in general intelligence than the non-dysphasic patients with comparable brain injury. The evidence presented in this paper provides no basis for selecting between these alternatives. There are, however, previously presented results which may not be irrelevant to this consideration. Meyers[7] has reported an investigation in which he compared results obtained from dysphasic and control groups using a performance test requiring problem solving of a reasoning type. In this study there were no significant differences found in comparing the two groups. In a previous study[8] of the same patients as in the present report, using the Rorschach Test, no substantial differences were present between the dysphasic and non-dysphasic brain-injured patients. The conclusion is suggested from these findings that the second alternative is more likely correct than the first, viz., that there is no greater impairment of general intelligence in dysphasic than non-dysphasic patients provided the severity of brain injury is roughly equated. It might also be appropriate to suggest that there is no greater impairment of verbal intelligence in dysphasia, since no differences were found in these same brain-injured groups on the Rorschach Test, which is strictly a visuo-verbal method. This claim cannot be made definitely without further information of the factorial construction of the Rorschach Test. Results have been published[16,17,18,19] that indicate the verbal subtests of the Wechsler-Bellevue scale compose a group verbal factor very similar to Thurstone's Verbal Comprehension, V[20]. It would seem likely that this factor is represented in the Rorschach Test, but that the unstructured and permissive aspect of the procedure allows the dysphasic patient to express his intelligence, even though his language difficulties prevent such expression on the more specific verbal items of the Wechsler Mental Ability Scale. If this conclusion is eventually verified, the value of this study will be enhanced in two respects: (1) The results may be taken to indicate that verbal subtests of the Wechsler Mental Ability Scale type are inappropriate for measuring intelligence in dysphasic patients, and (2) further evidence will be present to support the indication that dysphasia represents a specific loss in avenues of expression and impression rather than a symptom of impaired general intelligence due to brain damage. These conclusions should be of interest not only to those concerned with the relationship of thinking and intelligence to speech functions but also to those occupied with the practical problem of rehabilitation and retraining of dysphasic persons.

The present results, within the limitations of the experiment, may be taken to imply that thought and expression are not the same, but rather are capable of selective impairment through brain damage, as represented by dysphasia. The previous results reported by Reitan[8] permit the fairly precise hypothesis that even though the verbal subtests of the Wechsler scale have been shown to cluster into a Verbal factor[16,17,18,19] which has been interpreted as a function of the amount of stored verbal information or meanings, the poor performance of dysphasic patients on these tests is likely not a reflection of loss in stored verbal information but more closely akin to impairment in Halstead's Directional factor of biological intelligence.[21] Halstead interpreted his Directional factor as the avenue for reception and expression necessary for intellectual functioning. It would appear that impairment in verbal expression, which may be thought of as one aspect of the Directional factor, was responsible for the poor scores of the dysphasic patients rather than a more fundamental loss in general intelligence.

Summary

The Wechsler Mental Ability Scale was administered to three groups of 17 subjects. The groups consisted of brain-injured patients with residual dysphasia, brain-injured patients with no dysphasia, and hospitalized controls. In the three groups the subjects were individually matched for sex and color, and as closely as possible for age and education. The dysphasic and non-dysphasic

brain-injured subjects were equated as closely as possible for the severity of brain damage. Inter-group comparison of the test results indicated no substantial differences between the control and non-dysphasic groups. The non-dysphasics obtained lower mean scores than the controls on four of the five performance subtests, although only one of these differences was statistically signficant with the small groups used. The dysphasic brain-injured patients obtained lower mean values on all of the verbal subtests than did either the non-dysphasic or control groups. In light of the results from other studies, this was interpreted as a function of specific impairment of verbal mechanisms of expression in dysphasia rather than as a loss in verbal intelligence as measured by the test used. It would appear that verbal psychometric tests of intelligence are not appropriate measures for dysphasic subjects, since the scores obtained are limited closely by the adequacy of verbal mechanisms of expression.

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Hyaluronidase in Insulin Coma Therapy

W. M. GYSIN, M.D., and J. L. WILSON, M.D.
Omaha, Nebraska

Treatment of schizophrenia with hypoglycemic coma produced by injection of insulin, although of recognized value,[1] is still an empirical procedure. Little advance has been made in the technic of insulin therapy for schizophrenia since the original observations of Sakel in 1933. The disease itself follows a highly variable course, and individual response to treatment appears to depend on a variety of factors, many of which are imperfectly understood or still unknown.[2] Even the basic mechanisms governing the biological action of insulin remain obscure despite the great body of research that has been devoted to many phases of the problem.

An important drawback to insulin coma therapy is the resistance of a certain percentage of schizophrenic patients, who appear less sensitive to insulin than normal subjects, and in whom enormous doses are required to produce a satisfactory result.[3] Insensitivity to insulin as seen in chronic schizophrenics may be an example of a general tissue resistance to change,[4] or possibly the result of hyperpituitarism.[5] Morgan and Pilgrim[6] claim to have demonstrated, but not yet isolated,[7] a hyperglycemic factor in the urine of some patients. Reiner and Scheflen,[8] in a statistical analysis of the vital signs in schizophrenics subjected to insulin coma, have postulated a pituitary-adrenal-autonomic nervous system function.

For most satisfactory effect, insulin must be administered by deep intramuscular injection, usually into the gluteus. The wide variability of absorption obtained in individual patients, however, has long been one of the major obstacles to production of a satisfactory coma. In many unsuccessful cases the difficulty undoubtedly has resulted from deposit of the drug in fatty, relatively avascular tissue adjacent to fascial planes and other areas where absorption is retarded. Thus with slow diffusion of the drug, prolonged over a number of hours, morning coma has failed or has been of insufficient depth, and usually has been attended by severe side actions. Onset of deep coma often has not occurred until late afternoon and in some cases has been delayed until after midnight.

The possibility that the spreading properties of hyaluronidase might be employed to promote diffusion and consequent early absorption of the injected insulin was suggested to us by two preliminary reports[9,10] which aroused our interest.

Physiology of Hyaluronidase. Hyaluronic acid, an acid mucopolysaccharide first isolated by Meyer and Palmer (1934) in bovine vitreous humor, is believed to be the major chemical constituent of the "ground substance", composed of simple and specialized types of connective tissue which surround and support the more highly differentiated cellular structures in the animal body. Present in the form of a gel, hyaluronic acid serves as a cement between the cells. While materials (such as metabolites and hormones) in transit from body fluids to individual cells pass through this connective tissue matrix, normally it is nearly impervious to invasion by external agents. The permeability of the intercellular barrier, however, may be altered or modified by a variety of physiologic influences and also by certain substances that promote diffusion of fluids in the tissues.

Hyaluronidase, the earliest known[11] and most potent of these substances, or "spreading factors", is known to have an essential part in a complex phenomenon involving an enzymatic action on the hyaluronic acid in the tissues, with consequent reduction in resistance to diffusion and absorption of injected fluids. The hyaluronidase used clinically and in experimental investigations is derived from mammalian—chiefly bovine—testes.

In 1947 Hechter and associates[12] began to use this enzyme to facilitate subcutaneous

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From the Department of Psychiatry and Neurology, Veterans' Administration Hospital, Omaha, Nebraska.

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absorption of solutions in hypodermoclysis, and their investigations were followed by numerous others. Many substances have proved adaptable to subcutaneous administration with the aid of hyaluronidase.

Our experiment was undertaken, in March 1952, to determine, in a scientifically controlled situation, whether addition of hyaluronidase to the insulin administered to induce coma will provide three much desired advantages:

1. Earlier and more complete absorption of the dose, with production of a deeper coma. Such action should enable more accurate evaluation of the coma level.

2. Reduction of the amount of insulin required to produce the necessary depth of unconsciousness, and consequent increase in the margin of safety.

3. Reduction of delayed side actions. (Late adverse effects have been attributed primarily to continued absorption of insulin for many hours after termination of the coma.)

In the studies of Straccia and Scheflen[10] hyaluronidase was added, in doses of 25 to 75 turbidity-reducing units, to the insulin administered to schizophrenic individuals, in an effort to overcome refractoriness, reduce high dosage requirements and long induction period, and increase the depth of the coma. Sacerdoti[9] had endeavored earlier to develop a method by which the amount of insulin could be reduced, with shortening of the precoma phase, lessening of agitation, and more rapid awakening. He reported that by adding hyaluronidase to the dose, more rapid and deeper descent of the blood sugar curve was obtained, producing an easier and more profound coma. However, Weller and Liccione[13] were unable significantly to enhance the rapidity or intensity of the effect of depot insulins in normoglycemic individuals.

Because of the unpredictable variations in the response of schizophrenic patients, it was impossible to set up a control series, in our study, by the method usually employed. Therefore, each patient was treated as his own control, and the record of his response to insulin alone was used as the individual standard. The history of our experience in 75 previous cases, using an average dosage of insulin, we felt might also be useful as a standard for comparison.

In a series of consecutive treatments with an established dose of insulin, a fairly large reduction in the dose on any one day will of itself produce coma on that day. Therefore the method used by Straccia and Scheflin,[10] in which hyaluronidase was administered to 7 patients on alternate days with a smaller dose of insulin, seemed to us infeasible. A consecutive series of comas produced with a regulated dosage promised to give better indication of the value of hyaluronidase in facilitating induction of coma.

At the start of our study some patients were included who already had had a number of comas induced with insulin alone. Since then, our method has been to regulate the patient on an established dosage of insulin for approximately 10 comas, then to introduce hyaluronidase with a smaller dose of insulin for 10 to 15 comas, and to return to insulin alone for the remainder of the course or, if possible, again to use hyaluronidase for an additional period. Up to the present (June 1953) a total of 53 patients has received insulin coma therapy under this plan.

The hyaluronidase used is available commercially as Alidase^{R} (Searle) and Wydase^{R} (Lyophilized Hyaluronidase, Wyeth). Wydase was chosen for continued use primarily because of its superior stability and because it can be obtained in 10 cc. (1500 TRU) vials. Hence it is possible to prepare enough Wydase solution at one time for up to two weeks of treatment, which saves a great deal of time and effort for the nursing staff.

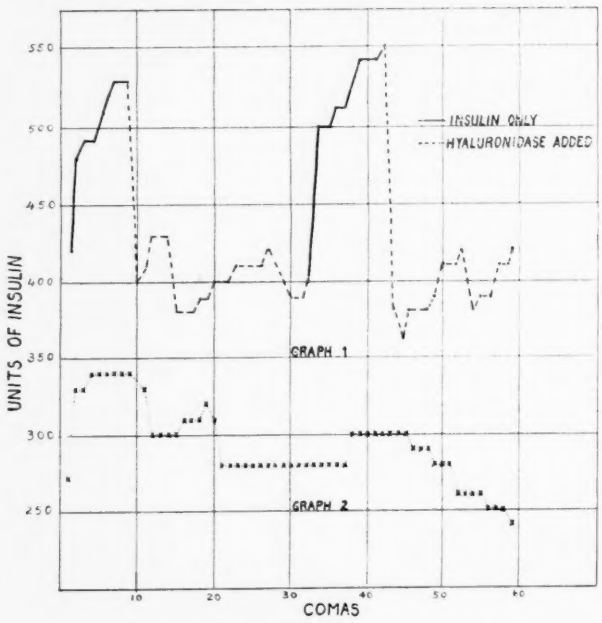
The recommended dose, after reconstitution with physiologic saline or distilled water, is 1 cc. of solution (150 TRU Wydase), to be injected with the insulin. Since, in coma therapy, this amount of hyaluronidase would have to be used daily over a long period (rather than occasionally, as originally intended when the dosage was established for other indications) the expense probably would be considerable. We therefore experimented in an effort to reduce the amount of hyaluronidase used with the insulin, since it seemed to us that 1 cc. was not actually necessary for each injection. We found that 0.3 (about 50 TRU) to 0.5 cc. (75 TRU) of

Wydase solution was as satisfactory as 1 cc. (150 TRU). We also found that the size of the dose of insulin, whether large or small, made relatively little difference in the amount of Wydase required to promote diffusion and absorption. At the present time we use about 0.5 cc. Wydase solution with each injection.

Results

1. The quality of the coma was improved. Induction was smoother, with less excitement and restlessness and more rapid progression through the subcoma to the coma phase (stages I and II). There was little change, however, in the time of onset of coma symptoms.

2. Less insulin was required to produce a satisfactory coma in most patients, the reduction in dosage for the entire series averaging 35 to 40 per cent. In 9 cases the total amount of insulin used for the course was reduced by 50 to 73 per cent.



In the typical case taken at random from our previous series of 75 patients treated with insulin alone, the dosage level showed relatively little fluctuation after the initial dose was established (graph 2). In the present series, using insulin with addition of Wydase, there was a sharp drop in the requirement of insulin which was maintained throughout the period when Wydase was used (graph 1). When use of the enzyme was discontinued, the insulin requirement was sharply increased. However, in most cases when Wydase had been introduced and then insulin alone was resumed, it was seldom necessary to continue with as large a dose of insulin as had been necessary previously. We are not able to explain this finding at present; it may have been caused by factors unrelated to treatment.

3. Delayed adverse reactions were reduced by 73 per cent. Prior to the initiation of this study, no record had been kept of postcoma side actions except in the notations of the nurses. For comparison, all such data available on the patients who were under treatment during January and February, 1952 were re-examined to determine the incidence of delayed side actions. It was found that 36 per cent of this group had required oral or intravenous glucose during the afternoon or evening of the days on which coma had been induced.

Through this study a description of such reactions, when they occurred, was incorporated in the daily record of each patient. Since only a portion of the group were receiving hyaluronidase at any given time, the computation was based on the total number of treatments, with and without hyaluronidase, given during each month. It was found that late reactions, determined on this basis for the first three months of the investigation, were encountered in 35 per cent of patients receiving insulin alone, and in only 9.4 per cent of those for whom hyaluronidase was used.

For the total of 53 patients observed throughout the entire study, however, the average reduction was somewhat less dramatic because 6 individuals in the group were apparently refractory to the treatment, and experienced delayed reactions almost every afternoon even though hyaluronidase was added to the insulin they received. This relatively small group accounted for about 20 per cent of all late side actions that occurred in the entire series. When it was found that these individuals did not seem to respond to the hyaluronidase-insulin mixture as expected, the dose of hyaluronidase was increased to 1 cc., then 1.5 cc., and finally to 2 cc. Five of the 6 showed no change, but the sixth experienced a satisfactory re-

sponse when 1.5 cc. Wydase was added to the insulin.

The need of intravenous glucose after termination of the coma has also been materially reduced. Only three intravenous injections have been given in the past six months, and none of these were administered after 5 p.m.

4. In no instance was there evidence of any localized or systemic toxicity, or of hypersensitivity to Wydase.

Summary

In a series of 53 schizophrenic patients studied throughout the period from March 1952 to June 1953 a definite therapeutic advantage was obtained by adding Wydase to the insulin administered intramuscularly to induce coma.

The amount of insulin required to produce the desired level of unconsciousness was reduced by 35 to 40 per cent (in some cases the total amount of insulin used in the course was halved), and the margin of safety was correspondingly increased.

The quality of the coma was improved. Induction was smoother, with less agitation, and more rapid progression through the precoma to the coma phase.

There was relatively little change in the time of onset.

Late adverse reactions were reduced by about 73 per cent because the insulin was more rapidly and completely absorbed in the morning hours.

The dosage of Wydase used in this series ranged from 0.3 to 1 cc., but since results were equally good with the smaller amounts, doses of 0.3 to 0.5 cc. are recommended, regardless of the amount of insulin administered.

A small percentage of individuals were apparently refractory to this treatment. In 5 there was no appreciable change in the dosage level of insulin required, despite use of up to 2 cc. hyaluronidase. One patient, refractory to the smaller doses, responded satisfactorily when 1.5 cc. Wydase was added to the insulin.

September 16, 1953.

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Common Factors in Diverse Psychotherapies

A. H. CHAPMAN, M.D.
Kansas City, Mo.

The term psychotherapy as employed here refers to any type of patient—therapist interpersonal relationship designed to help the patient. The relationship may be occasional and non-specific as in palliative management of a chronic problem, or intense and very specific as in classical Freudian psychoanalysis.

Skillful therapists have always been intuitively aware of the importance of their interpersonal relationship with the patient in the success of their efforts. References to this are found throughout the history of medicine. However, only in the past 75 years has there been any attempt to build the use of interpersonal relationships into a systematic therapeutic science. Its use has been largely directed toward treatment of mental disturbances but it has lately been extended in psychosomatic medicine to a much broader spectrum of human dysfunctions.

That psychotherapy is useful and practical is evidenced by its extensive use in a critical and scientific age. Its various proponents are much less in harmony in their beliefs as to how and why it works. It is alleged by many that there are major differences in the various psychotherapeutic techniques and in the fundamental processes that go on in psychotherapy and contribute to the beneficial results.

It is our purpose to point out the fundamental common factors of the various psychotherapies, and compare their importance in the major types of psychotherapeutic approach. Such an attempt cannot be either complete or definitive at this time since psychotherapy is "not yet a science, but a science in the making."

Psychotherapeutic Techniques—Psychotherapies

The various techniques that may be involved in a psychotherapeutic approach may be briefly listed and defined as follow:

1. Catharsis, the verbal ventilation of one's feelings and thoughts in a permissive atmosphere that does not respond with emotional reactions or moral judgments toward the patient.

2. Insight into the patient's relationships with other persons in his current life situations.

3. Insight into the patient's relationships with significant persons in his past life situations.

4. Analysis of the patient's interpersonal relationship with the therapist.

5. Unanalyzed aspects of the patient's interpersonal relationship with the therapist, in which the therapeutic values and effects of this relationship are not verbally dealt with by the patient and therapist.

6. Direction, the giving of specific recommendations and advice to the patient as to the management of his problems and affairs.

7. Suggestion, strong persuasive advice to the patient with a markedly optimistic overtone as to symptomatic improvement if the suggested procedure is carried out or the optimistic advice is accepted.

8. "Conditioning," the repetition of specifically structured interpersonal situations between patient and therapist, designed to induce in the patient a habitual mode of handling certain problems or feelings.

It is believed that virtually all mechanisms of psychotherapy can be adequately and aptly described as falling into one of these categories. Various therapies will have special terms and connotations; "transference" and "countertransference" phenomena will be included under "analyzed patient—therapist relationship."

However, it must be pointed out, that such categorical separation can never be absolute and that to a certain extent there is an element of all of the basic techniques in all psychotherapies. For instance, any impressive therapeutic measure, whether it be prolonged psychoanalysis or a highly emotionally charged single interview, has a certain suggestive element in terms of symptomatic improvement. However, the major therapeutic value in either case would not usually be attributable to suggestion.

Experienced psychotherapists will as a rule be alertly aware of which basic technique they are employing and the degree to which it is being used. However, even the most experienced psychotherapist will occa-

From Psychiatric Unit, the Children's Mercy Hospital, Kansas City, Mo.

sionally find, in retrospect, that he partially overlooked some aspect of treatment that might have been therapeutically important. This is particularly true of unanalyzed patient—therapist relationships, elements of which the therapist was either unaware of or underestimated.

In spite of these limitations, and others to be mentioned later, it is felt that enumeration of these basic mechanisms of therapy is important and useful in examining and comparing various psychotherapeutic techniques.

Below is an enumeration of the psychotherapies more widely used in this country. The list is not complete, but certainly the majority of psychotherapy falls into one of these areas.

1. Psychobiological distributive analysis and synthesis is a flexible life history discussion technique developed by Adolf Meyer and widely used with various modifications. It emphasizes a thorough analysis of the patient's life history, illness, and synthesis of the relevant etiological emotional factors into an interpretative discussion of the problems with the patient.

2. Psychoanalysis is the therapeutic technique developed by Sigmund Freud, in which the patient verbalizes his thoughts and feelings with as few inhibitions and extraneous distractions as possible. The therapy continues over a period of one to several years, emphasizes: (a) the patient's early traumatic childhood experiences, (b) their repetition in the patient's feelings about the therapist, and (c) the many resistances the patient experiences in attempting to verbalize.

3. Modified brief analytic techniques, as typified by the work of Franz Alexander, involves a variety of attempts to conduct Freudian analytic therapy on a less intensive and less prolonged basis, with a somewhat more active role by the therapist and a tendency toward more attention to current situations.

4. "Learning theory" therapy refers to a somewhat less widely described technique which aims at instructing the patient in the interview situation as to the pathological ways he handles his problems, and giving the patient fairly concrete recommendations as to how to develop new ways of handling emotional problems.

5. Social service psychiatric case work refers to a type of psychotherapy which often has more of historical developmental unity than theoretical unity. It, however, refers in general to a variety of interview measures developed by social workers, and integrated from most other psychotherapies, in the evolution of their profession during the past half century. Despite certain differences among social workers a basic similarity predominates in the ways any well-trained social worker approaches the problems of the client.

6. Rogerian therapy developed by Carl Rogers, emphasizes the therapist's interpretation of the patient's feeling tones with relatively few other interpretations.

7. Repressional-inspirational techniques represent a wide spectrum of psychologic approaches to mental problems, in which the main therapeutic emphasis is on the emotional support the patient obtains from devotion to a faith, movement, cause, or person alleging healing powers. Often there are strong spiritual overtones.

8. Hypnosis is a special technique whereby the patient is induced into a state of reduced consciousness and constricted attention during which he is amenable to suggestions of symptomatic improvement.

9. Palliative psychotherapeutic management refers to a variety of superficial measures used over long periods of time to give limited symptomatic relief to patients who have proved refractory to more ambitious and intensive psychotherapy.

Comparative Evaluation of the Various Psychotherapies

Table I seeks to evaluate these therapies in terms of the aforementioned basic techniques. In Table I each of the therapies is scored for the basic techniques used and a value of "minimal," "moderate," or "major" is set, in terms of the degree of usage of the method.

These valuations, based upon descriptions of the therapies in the literature and upon the author's personal experience with therapists using them, represent a synthesis, and aim to be representative of the particular psychotherapy, rather than inclusive of all its adherents. The purpose of such tabulation is to crystallize in an easily handled brief form, the various psychotherapies, so as to provide a common ground for comparison and discussion. It is designed to give psychotherapists a set of common denominators in discussing their work and to profit by the techniques of their colleagues. Behind such tabulation is the implication that every therapy has a field of useful activity and that the choice should be influenced more by the needs, goals and capacities of the patient than by therapeutic background and preconceptions of the therapist.

Certain further limitations in such an approach to comparison and valuation of different therapies must also be mentioned. (a) In psychotherapy the whole is always something more than its parts. The total therapeutic relationship contains elements

which are very difficult to break down, and analysis of its parts can never give a complete picture of the whole. (b) There will be distinct and often wide differences among practitioners of any particular psychotherapy and although the classification attempts to include the basic approach of each type, individually it may in some respect not exactly fit the pattern. (c) In terms of content and depth of activity in a given technique there will be distinct, and perhaps wide differences in therapies from one psychotherapist to the next. For instance, the inability of a patient to express aggressive feelings might be handled on at least three different levels: Simple interpretation of his inability to be aggressive; anxieties about loss of love and affection from those toward whom he might be aggressive; the distant past relationships in his life in which he first experienced emotional trauma in the area of his aggressive feelings, etc.

With these limitations of the method clearly in mind, it is felt that such approach toward the examination and evaluation of the various psychotherapies is helpful in obtaining a clearer understanding of both the common grounds and differences in the various therapies.

Examination of Table I makes it apparent that the first six types of therapy have a tendency to form a group with many similarities, and that the last three form a group with other common characteristics. The first group, comprising psychobiological distributive analysis and synthesis, psychoanalysis, modified analytic techniques, "learning theory," social service case work, and Rogerian therapy, may be termed the exploratory and interpretative psychotherapies. They all attempt in some manner to explore the psychologic bases of the patient's difficulties, and to somehow interpret this information to him. The last three types form a group characterized by repressional and symptomatic emphasis, since they deal largely with the symptom and attempt to ameliorate or repress it primarily by suggestion and the personal influence of the therapist. Thus they do not deal, except in a superficial and incomplete manner, with the basic psychologic determinants of the symptom.

The exploratory — interpretative group places a good deal of stress on catharsis and insight into current interpersonal relationships in the patient's life. There is a tendency to put only minimal emphasis on unanalyzed patient-therapist relationships and

TABLE I

COMMON FACTORS IN CERTAIN WIDELY USED TYPES OF PSYCHOTHERAPY

	Catharsis	Insight, Current Relationships	Insight, Past Relationships	Analyzed Patient-Therapist Relationship	Unanalyzed Patient-Therapist Relationship	Direction	Suggestion	"Conditioning"
Psychobiological Distributive Analysis and Synthesis	++	+++	++	+	+	+		
Psychoanalysis	++	++	+++	+++	+			
Modified Brief Psychoanalytic Therapy	++	++	++	++	+	+		
"Learning Theory" Therapy	++	+++	+	+	+	++		++
Social Service Casework Therapy	++	+++	++	+	++	++		
Rogerian Therapy	+++	++	+	+	+			
Repressional-Inspirational	++				+++	+++	+++	
Hypnosis					++		+++	
"Palliative" Psychotherapeutic Management	+	+			++	++	++	

Legend=Usage, + minimal, ++ moderate, +++ major.

to avoid suggestive techniques as much as possible. Only "learning theory" deals to any extent with "conditioning," with a varying amount of direction. Only "learning theory" and social service case work use this as a major tool. Thus there is a large element of unity of approach in the various exploratory-interpretative psychotherapies. In the areas of degree of usage of insight into past relationships, and analyzed patient-therapist relationship there is considerable divergence. We find the psychoanalytic therapies placing great emphasis on these two areas, while the others use them less. This is most marked in the analyzed patient-therapist relationship. The divergence is distinct, but less marked in the area of insight into past relationships.

The therapies in the second group consisting of the repressional-inspirational approach, hypnosis, and "palliative" psychotherapeutic management, have a basic similarity of operation. They all stress suggestion and unanalyzed patient-therapist relationship, and with the exception of the use of direction in two of them and catharsis in one, they do not make significant use of any of the other techniques.

The total impression is that the exploratory-interpretative group, in which the greatest divergences are seen, has more similarities than differences. After their differences are pointed out, as noted above, their similarities stand out and indicate wider areas of agreement. The differences between the various exploratory-interpretative psychotherapies are differences of species rather than of genus and the varieties of approach are closely related basically.

With these factors in mind our tabulation offers psychotherapists a common ground for the mutual discussion of patients and treatment and a basis for appreciation of their various skills. The differences are more in terminology than method; and the tabulation may offer a basic vocabulary of techniques.

The limited scope of this article precludes similar consideration of some of the other types of psychotherapy as psychodrama, hypnoanalysis, etc. It is felt that each of these, too, might be profitably examined in the light of a similar approach in order that the therapist might have a clearer concept, in terms of his own techniques and skills, as to what each type of therapy has to offer both his patients and his own wider usefulness to them.

Summary

The basic factors in psychotherapy have been enumerated, and the major types of psychotherapeutic approach compared in terms of the extent to which factors are utilized. The many similarities of the various approaches, as well as certain significant differences, are pointed out.

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Unipolar Electrocerebral Stimulation

(A New Method in the Treatment of Psychiatric Disorders)

JOSEPH EPSTEIN, M.D.
New York, New York

Since the introduction of the Bini Cerletti technique of electroshock treatment, constant efforts have been made to alter or modify it so as to reduce the danger to the patient and yet maintain the therapeutic efficiency. It cannot be denied that it is a crude push-button type of treatment where, once it has been applied for the predetermined voltage and time setting, there is no retreat or further control over the violence of the ensuing convulsion and any immediate complications therefrom. The complications of this method are too well known to be elaborated upon here, save to mention the most serious, namely, cardiac collapse, fractures, disabling muscular pains and strains, prolonged apnoea, confusion and memory defects.

The most important step in reducing the violence of the convulsive seizure has been made with the introduction of the unidirectional low-intensity currents. With these, the violence and roughness of the convulsions have been lessened and the complications seem reduced in frequency and severity.[1] Further refinements in convulsive technique were introduced by means of unilateral placement of electrodes and production of unilateral convulsions. Impastato[2] places his electrodes over one ear several inches apart and one or two inches from the sagittal suture. By controlling the current introduced through such electrode placements, the convulsive reaction can be slowly initiated. It is predominantly localized to one half of the body, but the current tends to spread transcortically and also probably subcortically by way of the corpus collosum, and a lesser convulsive movement ensues on the ipsilateral side. The spread of the current can be prevented and the convulsion confined to the contralateral side by placing the electrodes closer together and further away from the motor strip. This can be accomplished by bipolar placement frontally in front of the ear and about one inch apart. This modified type of convulsion greatly reduces the hazards of the bilateral convulsions as induced by the Bini Cerletti type of treatment. It also seems to reduce the confusion and memory changes. None of these methods solve the problem, however, and the question of whether the convulsion is necessary still remains to be answered.

A great deal has already been accomplished in the study of the neurophysiology of the brain as affected by electric currents. The fact that insulin coma and the various psychosurgical procedures can produce similar and in instances more satisfactory results than electroconvulsive therapy, lends credence to the belief that the convulsion is not necessary. The belief is further advanced by those who employ "electric sleep" or "electric coma" therapy.[3] The convulsion is an indication of diffuse cerebral irritation; a disorganization with a certain chain reaction and overstimulation of the individual neurones and the motor pathways—involving the cortical and subcortical structures. The coma and the motor convulsive phenomena indicate to us the diffuseness of the cerebral irritation. Along with this follow the confusion and memory disturbances. It would seem plausible that the motor responses and coma phenomena are complicating side effects not at all necessary in the production of improvement. The centres that require treatment are stimulated and included in the general overwhelming diffuseness of the current-spread, with consequent convulsion. The crux of the problem is still unanswered: Is the improvement in psychoses due to specific effects of direct stimulation of specific currents on specific areas, or is it a result of non-specific violent convulsive stress reaction due to the electrical current? . Spiegel et al.[4] believe that electric stimulation of the brain reaches all levels including the diencephalon and meten-

From the Clinical Service of Pinewood, Katonah, New York.

cephalon. The physiological concomitants, as pointed out by them, are a disturbance in the cerebral metabolic rate, and a greater permeability of the brain with an increased production of brain enzymes and an increase of nucleic acids and their breakdown products in the cerebrospinal fluid. Wilcox and Adler[5] have summed up the literature dealing with the physiological and biochemical changes found in association with convulsive electroshock therapy. A great deal of evidence is accumulating to the effect that stimulation of the hypothalamic region and the pituitary gland causes outpouring of adrenal cortical steroids, ACTH, and other hormones. Chemical balances are also altered: uric acid-creatinine ratios, water retention, lactic acid, glucose tolerance, etc. Which of such changes are incidental to the violence of the convulsive reaction, and which are part of the specific therapeutic chain of events, remains to be demonstrated. The pituitary adrenocortical system has been shown by many investigators to be affected by electrocerebral stimulation.[6,7,8] Many findings show the same element of confusion and doubt as to whether they were due to the stress of the convulsion or to specific biological effective currents. The currents hitherto necessary to affect deeper structures were applied to the head in a bipolar manner and the required intensities were of a magnitude which produced convulsions. As will be demonstrated below, this paper proposes a method of introducing the current through a unipolar electrode, which requires a comparatively minimal current, and which produces changes without a convulsive seizure.

The convulsion per se has also never been fully understood. Some believe it is due to a generalized diffuse cortical excitation. On the other hand, a great deal of evidence has been accumulating to the effect that the convulsive seizure pattern may originate in the thalamus,[9] and in fact other workers have deduced evidence that four distinct areas, namely, the thalamus, caudate nucleus, limbic cortex and motor cortex—may all act together to set off the convulsive seizure.[10] The seat of many of the neurological phenomena associated with the convulsion remains unexplained. Changes in the size of the pupils and their altered reaction to light, hippus, conjugate eye movements, sweating, salivation, flushing, sexual excitation, variation in respiration, pulse, blood pressure, etc., are phenomena which may arise from stimulation of specific cortical or subcortical regions or nerve pathways—but where and how has still not been demonstrated. It is becoming increasingly clear that the changes produced by electrocerebral stimulation have many components and that the actual convulsion may be an end result of unnecessary diffuse overstimulation.

Realizing that selective stimulation may have effects on specific psychotic or psychoneurotic syndromes various workers have employed modified techniques to attain specific results. Heath and Norman,[11] employed the conventional A.C. electric shock machine, using 8 mm. electrodes over various sites corresponding to Brodmann areas 4, 11, 9, 10 and 6 B. They felt that there was an analogy between the lobotomy which isolated the autonomic cortex from the thalamus and lower centers, and electric stimulation through the frontal lobe anterior to the motor strip. In their opinion, profound excitation of the autonomic system might be the reason for clinical improvement, and this might be accomplished without the production of convulsions or memory changes. It is certainly apparent that recovery is not dependent on anoxia or on the violence of the muscular contractions associated with convulsion. Memory changes and confusion most likely are of no therapeutic significance and in instances may actually retard recovery by producing anxiety in the patient. Efforts to further an understanding of brain function in relation to therapeutic aims were advanced by Delgado et al.[12] in their work with intracranial electrode implacements. By means of these implanted electrodes, Delgado obtained corticograms at different levels and could also study the effects of selective stimulation on cortical and subcortical areas. Others have also attempted to implant electrodes within cerebral tissue to either produce convulsions[13] or to seek other changes by non-convulsive stimulation.[14]

The report contained in this paper is a preliminary one, describing an apparently new method of electrocerebral therapy and research. It consists of a unipolar elec-

trode application to selected areas over the intact head, with precise predetermined currents applied for precise periods of time. Reasoning that the application of bipolar electrodes may cause unwanted and unselective current spread, experiments were begun to eliminate this factor. It was felt that if the current could be introduced at one spot, it could be delimited in its lateral spread, and its penetrative quality much improved. It was also postulated that if such currents could be caused to penetrate into the areas which may be specifically concerned with functions governing the various mental syndromes, then we may be able to study their effects without the necessity of a concomitant convulsive seizure. The treatment about to be described consists of a unidirectional spiked wave current applied with a UNIPOLAR electrode to specified cerebral areas, and an indifferent electrode applied to the forearm.

Apparatus and Technique

The patient is anesthetized intravenously with a five percent solution of Sodium Pentothal preliminary to the application of the current. This is necessary because of the painful nature of the current at the low current intensity of application. The Impastato[15] technique has been found to be the most useful in determining the amount of pentothal required by the individual patient. The patient does not require any special preparation. He lies flat on his back with hands comfortably at his sides or folded over the abdomen. If his teeth should be jagged, a dental cotton roll is inserted between them after the induction of the anesthesia.

The indifferent electrode may be of metal and sponge synthetic and is applied to the right wrist—or somewhat above—in bracelet fashion. The active treatment electrode (negative) consists of a sponge synthetic disc about one to two centimeters in diameter and attached to the end of an insulated handle. The operator applies the current with the handle of the electrode directly to the desired area. By virtue of its unipolarity, no current is perceived by the operator and he can at will alter its direction instantly, the current being made or broken at the point of contact with the head. In our psychiatric treatment technique, three areas on each side of the head are subjected to the unipolar stimulation for periods of ten seconds each. The areas correspond approximately to Brodmann 9, 10, 11, 44, 45 and 47. The first placement of the electrode is one to two centimeters above the orbital ridge in the mid-pupillary line. The second placement is near the hair line—eight to nine centimeters above the orbital ridge in the mid-pupillary line. The third application is in the temporal region just above and in front of the ear. Treatment is generally given bilaterally, making a total of six areas stimulated with the unipolar current. About ten seconds is allowed to elapse between each area treated, during which the patient is allowed to relax and resume breathing. Thus the total duration of current application is about sixty seconds and the total duration of treatment two minutes.

The conventional Bini Cerletti type of apparatus cannot be used. The Reiter CW47C was used in this work since it is capable of delivering controlled low intensity currents with pre-set pulse groupings (modulation). The electric current of this machine consists of approximately 30 groups of spiked pulses, with approximately 12 spikes in each group. Each spiked pulse of the group rises sharply and drops sharply. Increasing the modulation increases the number of spiked groups per second.[16] On applying one to two milliamperes of current to a frontal area of the head, there results twitching of the side of the face and eyelid corresponding to the side of application of the electrode. Increasing the current intensity to two to five milliamperes, results in the immediate appearance of bilateral motor and autonomic phenomena. The upper extremities become spastic and adducted, the forearms tightly flexed (occasionally extended), the hands pronated, and the fingers assume a decerebrate pattern. Tremor may or may not be noticeable. At the same time the lower extremities become spastic; the feet tend to assume an equinovarus position and become involved in clonic rhythmic tremors. These are synchronized with the pulse grouping frequency of the current. Frequently spontaneous Babinski phenomena are observed with a rhythmic clonic extensor flexion of the big toe. Increasing the

current intensity by one to two milliamperes increases the tonicity of the extremities. Should the current be increased beyond the 15 milliamperes reading, a convulsion may ensue. On the basis of our observations we feel that increasing the current beyond 15 milliamperes tends to bring about cyanosis, and an excess of salivation beyond the usual expected increase. When a convulsion is allowed to ensue by maintaining the current at an elevated level, there appears an increased tendency to cyanosis and prolonged apnea. These reactions are more intense than when convulsions are produced with the same apparatus by conventional bipolar methods, and it is felt that the profound reaction may be due to excessive stimulation of medulla, and should be avoided.

After the completion of the treatment most patients remain quietly asleep until the Sodium Pentothal wears off. There are some patients upon whom the current seems to have an "awakening" effect, and larger amounts of Sodium Pentothal are required to keep them sedated. It would seem logical to assume that the penetrating effect of the current stimulates hypothalamic sleep centers, tending to upset the action of the drug. Some of these patients tend to awaken upon completion of the treatment and show various degrees of emotional reaction—crying, laughing, being amorous, irritable or fearful.

Discussion

This method introduces unipolar focal electric stimulation. It is instantaneous and deeply effective. It causes generalized tremors and decerebrate phenomena without convulsions and the concomitant dangers of the latter. The small amount of current necessary to produce such profound changes, undoubtedly passes into and is conducted through the brain stem to produce its effect. This is made possible by the fact that the current is introduced at a single point and conducted through the brain stem by means of an indifferent electrode located beyond the brain stem. Conceiving of the brain as analogous to a mass of gel, the tendency of a current introduced through such a unipolar route is to go deep and to limit its cortical spread. This is in sharp contrast to A.C. currents that are introduced through classical bitemporal or bifrontal electrodes. Here the direction is influenced by the bipolarity of the current and the effect comes from diffusion of the current and the high intensity at which it is triggered. With the unipolar method, it is felt that greater stimulation, with much less intensity of current reaches the diencephalon and also the metencephalon. Thus the hypothalamus and its neighboring structures are easily affected. The tremors observed which are bilateral and almost instantaneous can be interpreted as arising from pyramidal tract stimulation in the brain stem and below. Further proof of this can be adduced by the fact that the unipolar stimulation does *not* bring about unilateral convulsive movements or tremor such as the bipolar placement of electrodes on a unilateral side of the head can produce. In this latter technique, there begins a convulsive movement on the side of the body contralateral to the placement of electrodes, and if the current is not increased, the convulsion can be kept localized to one side. This can be interpreted to mean that the stimulation is not deep and is limited to one hemisphere and therefore the convulsion is confined to one side of the body. As the current intensity is increased, lesser convulsive movements appear on the ipsilateral side. This can further be interpreted in the light of current spread; cortically and not deep so that as it reaches the opposite motor cortex, movements begin to appear ipsilaterally. With the unipolar stimulation, the picture is an entirely different one. In spite of the single active brain electrode, a unilateral seizure can not be induced. We are instead confronted with bilateral and instantaneous phenomena involving all extremities as well as other manifestations which differ from those found in bipolar electrode therapy. Considering that small currents produce these effects, there can only be one conclusion and that is that the stimulation hits the motor pathways where they are close together—in the brain stem and below. We consider these motor phenomena as indications of the depth of penetration of the current, and its stimulating those areas which we have reason to believe are concerned with the mechanisms of thought processes and behavior. Thus general convulsions are entirely avoided and in-

deed the clonic tremors and rigidity are used only as an index of "arrival" of the current. Another indication to us of the depth of penetration of the current is the interesting pupillary changes. We have frequently found during the period of application of the unipolar current that the pupil on the ipsilateral side of the head is constricted and the pupil on the contralateral side is dilated. Heretofore, pupillary alterations have been bilaterally uniform, their alternate dilation and contraction phenomena having been considered part of the massive disorganization of the neuronal cerebral structure following the "chain reaction" of the convulsive current. Possibly it was due to adrenal stimulation. Whatever it was, however, it was bilateral —affecting both pupils equally. With unipolar stimulation, however, the unequal effects on the pupils may be thought of in terms of direct stimulation of specific pathways. The fact that they are unequal is probably due to the added effect of the current upon certain suppressor pathways as it passes through the cortex on the side of application of the electrode prior to stimulating other deeper fibres or centers directly concerned with autonomic control over the pupils. Another indication of profound changes in the eyes with such small non-convulsive and non-coma-producing currents is found in the intense conjugate downward or upward movement of the eyes and frequent nystagmus during the application of the unipolar current. This may also be explained by the fact that the current descends to the diencephalon and stimulates specific pathways.

Other demonstrations of profound stimulation of the autonomic system by these unipolar currents is amply found—flushing, salivation, sexual excitation, alterations in respiration, heart rate, blood pressure, etc. Blood pressure studies were made on a series of 20 patients. Pulse rates and pressure readings were taken before the Sodium Pentothal injections; immediately following the induction of anesthesia; following each unipolar electrical stimulation; and at a ten minute and one hour period after completion of the treatment. In a general way it was found that there was an initial drop in both systolic and diastolic pressure following the induction of the anesthesia. After applying the unipolar current, it was found that the systolic pressure tended to elevate but not above the resting level; the diastolic pressure remained at the lower level. The current, however, uniformly increased the heart rate from twenty to forty beats per minute over the prepentothal level. It was also noted that in some instances there was a tendency for the diastolic pressure to drop ten or more millimeters toward the end of the treatment, and up to ten minutes after the completion of the treatment, while the systolic level maintained itself. We found instances where the blood pressure rose when there were insignificant pulse changes, and occasionally there was an increased pulse with a lowering in blood pressure. Thus the pulse-blood pressure changes in connection with the unipolar stimulation were profound, but not uniform. The one positive observation is that during or immediately following the treatment, the blood pressure did not rise above the level found prior to the injection of the Sodium Pentothal. From thirty minutes to one hour after the treatment, the blood pressure and pulse seemed to stabilize to the pretreatment level.

Results

Our preliminary studies with a group of 22 patients point to results similar to that obtained with conventional convulsive shock treatment:

6 Manic Depressives who had previously recovered with conventionai E.S.T. have recovered with unipolar non-convulsive stimulation. Treatments were administered three times a week. The least number of treatments required were six; and the highest number fourteen; the average for the group being ten.

2 Involutional Melancholias have recovered with an average of twelve treatments.

1 Psychosis with Cerebral Arteriosclerosis is unimproved. Treatment was discontinued after the twelfth time.

2 Mixed Schizophrenics are unimproved but still under treatment.

8 Schizophrenics are much improved and seem to have made social recoveries.

1 Pseudoneurotic Schizophrenic has recovered.

1 Pseudoneurotic Schizophrenic is unimproved.

1 Psychosis, following brain tumor operation was much improved and seems to have made social recoveries.

1 Pseudoneurotic Schizophrenic has recovered.

1 Pseudoneurotic Schizophrenic is unimproved.

1 Psychosis, following brain tumor operation was much improved. This was in a 55 year old woman who had a large right cranial defect over the right temporoparietal region. She developed persecutory ideas with hallucinations of smell. The latter might have originated on an organic basis following operative injury to the uncal region of the temporal lobe. Following twelve treatments, she was much improved. She still had residuals of her psychosis but had lost the intensity of response toward her symptoms, and was able to be cared for at home. The treatment given this patient was ideally suited to the cerebral pathology in that the current was applied unilaterally to the side of the head not involved in the operation.

We are omitting further clinical histories in our cases, since they will not serve the particular purpose of this communication. We wish to note however, that all our patients are hospitalized and their psychotic conditions are of a severe enough nature as not to be able to be treated in an ambulatory manner as outpatients or in private practice. On the basis of this limited series of cases no definite conclusions can be drawn. It is evident, however, that this method of treatment deserves further intensive study. It is also evident that the results, even conservatively interpreted, seem to give promise of importance.

Summary and Conclusions

We have described here a new method of electrocerebral treatment. It consists of the introduction of a spiked pulse type of unidirectional current through a unipolar electrode into selected regions of the head. All evidence points to the fact that the current reaches the diencephalon and metencephalon and stimulates the thalamic and hypothalamic regions. This is accomplished without the necessity of a convulsive seizure. Previous methods have involved bipolar application of electrodes to regions of the head and the diffuseness of the current spread brought about a general cerebral reaction. This is obviated with unipolar treatment. With this method all danger of fractures is eliminated. This means also that curare and curare-like drugs become entirely unnecessary and removed from consideration as adjuncts in treatment. There is also a complete absence of confusion and forgetfulness. This method extends the possibility of treatment to patients heretofore considered as presenting findings to contraindicate conventional electroshock. By adjusting the current to minimal levels, there is no fear of cardiac or respiratory embarrassment. Apnoea is entirely under the control of the operator, and muscular movements and spasticity can be controlled and reduced to such a level that no possible fractures can ensue. And yet, the penetration of the current will be of sufficient depth to stimulate the thalamic and hypothalamic regions. The changes produced by this lead us to believe that it penetrates through the diencephalon and the reticular activating system of the brain stem, including the medulla. This technique will lend itself to extensive research, both clinical and experimental. By making it possible to stimulate these areas without convulsive reactions, it will enable us to acquire new data along biochemical, endocrine, hematologic and other avenues, and to compare these findings with those already available in connection with convulsions.

Since this is a preliminary report, we have outlined general methods of treatment. By alterations in the parameters of treatment such as electrode placement, current and timing, it is hoped that greater specificity in treatment may come to light.

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Emotional Adjustment of Radar Observers in Jet Fighter Interceptor Aircraft

JOSEPH J. REIDY, M.D.
HORACE F. DRURY, M.D.

Introduction

In 1950 the Flight Surgeon at this base became concerned about the adjustment of the radar observers of the jet fighter squadron. At that time he conducted a survey of these men and found three common causes of dissatisfaction. They were: (1) the observers did not want to fly with different pilots, but preferred to fly almost exclusively with one pilot; (2) as radar observers, there was little opportunity for advancement; (3) men who were physically too big for the limited radar observers compartment were being assigned to the aircraft. In May 1952, the Flight Surgeon recommended that the Wing Psychiatrist study the problems of the radar observers since he felt that there had been little improvement in their situation.

Procedure

The present study was divided into two phases. The first group studied was composed of radar observers who had been stationed at the base for some time preceding the beginning of the project. All of these men were extensively interviewed and one was treated subsequently as an outpatient. By August 1952, most of the first group had left the theater in process of normal rotation, and the first replacements were studied. These men were interviewed on three occasions, during the summer, autumn and winter of 1952. The interviews were conducted on a day when these men were flying and on the day of the interview, blood and urine samples were collected for eosinophil counts and for determination of the urinary 17-ketosteroid excretion. During the three seasonal periods, the same laboratory tests were conducted on five non-flying enlisted men of the hospital squadron.

Findings

The First Group:

There were 13 reserve officers in this group. Their ages ranged from 26 to 37 and the median age was 30.9 years. They had from 54 to 156 months of active duty and the median active duty time was 80 months. All had over 500 flying hours and four had over 1000 hours; seven had flying combat duty in World War II. All were high school graduates, three had graduated from college and two others had two or three years of college. Twelve were married and seven had children; all of the married men had their families with them at the overseas base. Nine had been voluntarily recalled to active duty and all except two were on indefinite active duty. All had spent at least one winter in Alaska.

The men were questioned as to any personality changes since their arrival in Alaska. Of the 13 men, ten complained of

From Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska, November 1953.

chronic fatigue, four of extreme fatigue. Seven noted increased irritability, two had mild depressive episodes and one had a slight degree of insomnia. Five told of an increase in the use of alcohol since beginning their flying duty in Alaska, and one case of severe alcoholism received out-patient psychiatric care. When asked to estimate their physical fitness, seven characterized themselves as "soft," one had constant back pain, one noted lack of sexual desire, and another had hemorrhoids.

Due to the shortage of radar observers at that time, these men were not usually assigned as team mates to specific pilots, but each flew with several of the pilots. Without exception, each radar observer wanted to fly exclusively with one pilot in whom he had confidence. Five men stated that there were several pilots with whom they would not voluntarily fly. Their reasons were: "too young," "careless," "takes unnecessary chances." In stressing the team concept, the men pointed out that the experienced radar observers had a very necessary part to play in intercepter operations, but the younger pilots did not rely on their advice.

All complained that the cockpit space for the radar observers was too limited and that when encumbered with winter flying gear, parachute, and survival kit, they were compressed into cramped positions. In such positions it was not easy to adjust the body to meet the sudden changes in gravity forces that constantly occur in fighter interceptor work. The four men who complained most of the cramped position were the tallest of the group, all being over 70 inches, and two of them weighed approximately 170 pounds.

Individual Cases:

Five of the radar observers in this group merit more detailed discussion. Two had requested release from flying duty, one was a problem drinker, one had been injured in a bail-out, and the fifth was removed from flying status because of lowered convulsive threshold.

The first man who requested relief from flying duty was 34 years old, married and the father of three children. He had 156 months of service, over 1000 hours of flying, had completed 40 World War II combat missions, and had been voluntarily recalled to active duty. He was 72 inches tall and weighed 175 pounds. He complained of excessive fatigue, hemorrhoids, and varicosities in his legs, noted increased irritability and increased desire for alcohol. He felt that he had been malassigned because of the shortage of jet radar observers and that he should have been assigned to a larger aircraft. He was subsequently transferred to bombers at another base and appeared satisfied with the transfer.

The other man who asked for relief from flying status was 31 years old, married and had no children. He had 60 months of service, approximately 700 flying hours, and 35 combat missions in World War II. He had been involuntarily recalled to active duty. He stated that he "couldn't stand" flying anymore, that he was tense, always tired, and apathetic. He mentioned that even as a civilian he had been tense and had noted this in driving his car. He had become careless and indifferent about his flying, felt useless in his present assignment and said that he would rather be in combat. However, he had not volunteered for combat duty. He was 71 inches tall, weighed 130 pounds, and complained that he did not have enough room in the aircraft. This man was removed from flying status and shortly thereafter was discharged at the expiration of his active duty tour.

The third man was 31, had 102 months service, was married and had one child. His first wife had died suddenly six years previously and he had begun to drink heavily since that date. It did not appear that flying was responsible for his alcoholism, but he used many of the complaints of the other men as excuses for his drinking. Under treatment for the four months preceding his rotation from the theater, he abstained from alcohol except on two occasions.

One man, aged 28, married and with one child, had bailed out from a jet in severe winter weather. This man had 60 months of service, 131 hours of combat, approximately 800 hours of flying time and had been voluntarily recalled to active duty. He was under 68 inches in height and weighed under 150 pounds. He had sustained second degree frostbite of his right hand and fractures of his

right hand and facial bones in his jump. He was rescued within an hour. He did not want relief from flying status but was more cautious than the others in his choice of pilots and complained of severe fatigue and back pains.

The fifth man was 29 years old, married and had no children. He had been in service 83 months and had 500 flying hours but no combat missions. He had been voluntarily recalled and was also a rated jet pilot. He had a convulsive seizure and was removed permanently from flying status after a lowered convulsive threshold was found on EEG. The man was quite upset about this action and tried to persuade the doctors and his commanding officer to retain him on flying status. When interviewed routinely for this project, prior to the convulsive seizure, he had none of the symptoms the others complained of and had confidence in the "majority" of the pilots. He was 69 inches tall and weighed under 150 pounds.

The Second Group:

There were six reserve officers in this group. Their ages ranged from 21 to 27 years and the median age was 24 years. They had from 15 to 58 months of active duty and the median active duty time was 29 months. All had over 100 flying hours but less than 280 hours, except for one officer who had 950 flying hours. This last officer was the oldest of the group, had World War II flying combat experience, was one of the two married men and the only one with children. At the time this group was first interviewed in August 1952, three men had been in Alaska for three weeks and three for eight weeks.

In the first interview, only two men complained of occasional fatigue after long flights where the gravity forces were severe. One admitted a moderate increase in use of alcohol since flying in jet aircraft. One man noted frequent fainting in the aircraft and another had occasional blackouts and nausea. Two of these men were 71 inches tall, but did not weigh over 150 pounds, the others in this group were under 68 inches.

Each radar observer of this group, except the man who had World War II combat experience, had been trained with one pilot who had been assigned to this base with him and with whom he was to fly almost all of his missions. There was mention of only two pilots with whom these men would not fly and the reasons given in each case were "drinks too much," and "flies too low."

These men were all interviewed in the autumn and winter in addition to the initial summer interview. Only one man noted a moderate increase in irritability. None complained of the lack of room in the airplane and there were no complaints about the pilots.

In this second group, an attempt was made to correlate the psychiatric findings with objective laboratory tests which might be expected to reveal some of the physiological effects of psychobiological stress. For this purpose, 17-ketosteroid excretion and the blood picture were selected for study. At 0700 on the morning of each interview, each subject voided and discharged all urine. From that time on, until 1300 when the bladder was again emptied, all urine was saved in a canteen. This six-hour sample was brought to the laboratory at the time of the interview. Urine samples were kept frozen until analyzed. Aliquots were acidified with HCl, hydrolized at 80° C. for 10 minutes, cooled rapidly and then extracted with ether at room temperature. The extracts were neutralized, washed and evaporated to dryness. Ketosteroid determinations were carried out by a procedure employing m-dinitrobenzene and utilizing pure dehydroisoandrosterone as a standard. Blood samples were taken at the time of the urine specimens were delivered to the laboratory. Total leucocyte, differential leucocyte and direct eosinophil counts were made. Urine and blood samples were collected from a group of hospital corpsmen at the time of each set of interviews and were treated in the same way to serve as controls.

Although the sample population was too small to yield statistically significant results in the laboratory tests, the mean values for ketosteroid excretion were practically identical for subjects and controls (approximately 3 mg. for the 6-hour period) in July and August. In December, the mean values were again almost identical although somewhat lower than in the summer months. Any speculation regarding seasonal differences is completely unwarranted because of the ex-

tremely limited number of individuals and determinations involved. Suffice it to say that there was no difference between subjects and controls at any time with respect to ketosteroid excretion. Likewise, no differences were disclosed by the blood counts. All values were within the normal ranges with no detectable differences between subjects and controls. Thus, the laboratory findings were completely negative which would indicate that the members of the second group were at least reasonably free from tension. It is unfortunate that this study was not initiated early enough to permit similar laboratory tests to be done on members of the first group.

Observation on Survival Training

All men of both groups had attended the standard Arctic indoctrination course at Ladd Air Force Base, and therein had gained some knowledge of how to survive should they be forced to crash land or bail out. All had considerable respect for the climate of this theater. However, their thinking was almost universally along the lines of the "trail technique" of Arctic survival and travel. This appears to the authors to be somewhat unrealistic in view of the fact that the amount of survival equipment that can be carried in the aircraft is extremely limited. Since the jet interceptors are in almost constant radar contact with each other and with their base, the chances of survivors being located are good. This means that necessary supplies could be dropped to them. Their thinking on survival should be concentrated less on what they can cram into their survival kits, and more on how to make the most effective use of natural sources of shelter and fuel for environmental protection and on the best possible combination of clothing for survival.

Summary and Conclusions

Two markedly dissimilar groups of jet fighter interceptor radar observers were studied by means of psychiatric interviews. The first group was composed of older men, most of whom had had World War II combat experience and two of whom had asked for relief from flying status. Members of this group were not assigned to specific pilots. Several were quite large in body build; all but one were married. These men had many complaints about the pilots and aircraft and displayed symptoms such as alcoholism, excessive fatigue, irritability, etc., which could be manifestations of poor adjustment to assignments.

The median age of the second group was seven years less and only one had had combat experience. Each member of this group was assigned to a team with a particular pilot with whom he was trained and with whom he flew almost exclusively. All men in this group were short and slender; two men were married. This second group had few complaints about the pilots and aircraft and few somatic symptoms were noted.

Over a period of five months from summer to winter, these men showed little change. Studies of the leucocyte and eosinophil pictures and of the 17-ketosteroid excretion at three different seasons disclosed no differences between the members of the second group and those of a group of non-flying enlisted men. Unfortunately, blood work and biochemical studies were not done on the first group.

Although the scope of this study was too limited to permit evaluation of the roles of all variables, the following conclusions appear to be justified:

(1) The permanent assignment of each radar observer to a specific pilot was an important factor in the significantly better adjustment of the second group.

(2) The always desirable screening for size and body build in relation to aircraft crew space in the selection of radar observers is particularly important in climates where heavy clothing must be worn for survival following crash landing or bail-out and where accessory survival equipment must be carried attached to the parachute during flight.

(3) Although the severe cold climate of the theater appeared to have no effect *per se* on the results noted, the bulkiness of the clothing required and the resulting impairment of motion, excessive time required for dressing and the inconvenience of having to wear much of the clothing for long periods on the ground while on standby for alerts were constant sources of annoyance and complaints.

Book Reviews

THE PARIETAL LOBES by MacDonald Critchley, M.D., F.R.C.P., Edward Arnold & Co., Williams & Wilkins Co., 480 p. (1953).

The book properly begins with developmental comparative cerebral anatomy followed up by elaborate structural presentation of the parietal lobe in man. Sequentially, experimental physiological observations upon the parietal lobes purposed for correlation between anatomical knowledge and clinical studies, are described. A subequent chapter deals generally with the diverse and complex clinical manifestations of parietal symptomatology. Elaborate yet simply written, are chapters on disorders of tactile function as well as of motility, constructional apraxia, the varying disorders of the body scheme, as well as those involving various phenomena of corporeal unawareness. Not unmindful of the anatomically descriptive artificiality of parietal lobe delimitation, the author recognizes the importance of the excusions of the optic radiations and their association with the contiguous parts of the temporo-parieto-occipital regions and details the varying clinical phenomena of the visual disorders implicating the aforementioned site. Complicating parietal disease, there is exhaustive detailing and isolation of the difficult problems of spatial perceptive disabilities in respect of dimensional factors, the anomalies of space conception are descriptively discussed, and the more important interdimensional spatial manipulative handicaps as effects of parietal lesions are presented. As disorders of symbolic thought, the author details the phenomenology of the varying paradoxical performances where the complicated process of acquired reading becomes impaired in parietal disease. In the relation of parietal symptoms to dementia and hysteria, the general psychiatric considerations set forth a well rounded battery of guide posts which effectively serve as distinguishing factors in differentiating agnosic affections from demential states. However, there is no failure of admonition that a global dementia can at times follow a circumscribed lesion—leading to the question whether the clinical difference between focal and diffuse disease is not merely one of degree. After having dealt with the clinical syndromes of parietal disease according to lateralization of the lesion, in both right- and left-handed subjects, the author sums up by emphasizing that any claim to subdivide the cortex on the basis of cellular arrangement exclusively, ignores the all-important factor of axonal and dendritic connections. He further calls attention to the peculiar role of the parietal lobes in the building up of the postural schema to an important association with corporeal awareness, imagery and memory; and postulates that spatial manipulations and ideas are essentially bound up with parietal integrity, and that in so far as they entail tactile and visual perception, they may be concerned with three-dimensional qualities thereof. Finally, and in entire accord with this reviewer, the author counsels that no territory surpasses the parietal lobe in the rich variegation of clinical phenomena which follow disease states; that despite the lush variety of signs, they require special techniques for elicitation; that not only are there shortcomings to the ordinary routine neurological examination, but that conventional psychological testing also fails to do justice to the nature of parietal disorders.

The book is well set-up, intelligently written, generously illustrated by photographs, drawings and tables, well documented by case histories, profusely author-referenced throughout the text material, carries an exhaustive selective biography at the end of the book arranged in accordance with the chapter headings, and ends with a replete index.

The book is unique and comprehensive in its scholarly treatment and conception of a subject marking out the parietal sector of the cerebral hemisphere, and as a reference volume its possession on the book shelf of the Neuro-Psychiatrist should prove to be a welcome addition.

Lewis J. Siegal, M.D.

PRACTICE OF PSYCHIATRY by William S. Sadler, M.D., The C. V. Mosby Company, 183 p. (1953).

The contents of the present 1183 page volume have been progressively organized and subdivided into seven parts comprising a total of some 75 chapters, with concluding bibliography and a generous glossary of psychiatric nomenclature frequently interspersed with concise definitions of outstanding pioneers of psychiatric medicine. While a goodly amount of the well-established text material culled from the previous edition has been retained in the present book, much new matter has been added in keeping with the march of psychiatric progress, and some of the innovations, inclusions and present textual contents merit attention.

The chapter on psychiatric testing is rather elaborate, is a welcome addition, appropriately belongs in the book, and is understandably written. While the province of the manipulative details of testing is the purview of the clinical psychologist in the latter's collaboration with the therapist, the physician's working knowledge of the various psychological tests become his useful and important adjunct in the evaluation of the mental and emotional states of patients under his care. The chapter dealing with the classification of psychiatric disorders includes the author's own, the classification which had been in use by the American army, and the one employed by the British military services. There is also reproduced a classification of mental disorders of the American Psychiatric Association. The latter classification is outdated however, and in that form has not been current since 1952. From then on, it has been replaced by the presently established

Standard Nomenclature of Mental Disorders. In the author's six chapters dealing with the manifold maladjustments and complexes under the general diagnostic category of the pathoses, he critically discusses the nature and significance of the manifold preneurotic attitudes and adds thereto a transcript of the procedures and attitude therapy as formulated by Frederick Thorne who first proposed the term 'pathosis.' Areas of the chapter on toxic reaction types have been rewritten to include the psychological disutrbances occasioned by the consumption of marihuana, atabrine, and the bromides, as well as a discussion of epidemic encephalitis and its late effects as psychobiologic sequelae. The chapter on classification of personality has also been rewritten and enlarged, and he interpretatively discusses Sheldon's classification of psychobiological determinants. The author textually reproduces Cleckley's hypothesis in the chapter which he titles the Psychopathic Personality; but nowhere does he describe therein this personality disorder of psychogenic origin in the manner and nomenclature now currently in use since 1952 under the category of Sociopathic Personality disturbance and their variously differentiated reactions included thereunder, in conformity with said category, to wit: Antisocial Reaction, Dyssocial Reaction, etc. The author explicitly retains the old term and elaborately describes the subject matter to which he thus refers as the "clinical picture which I designate as Psychopatic Personality." The chapter on Alcohol Problems has been extensively rewritten, comprehensively enlarged, and includes an outline of the Alcoholics Anonymous plan of dealing with problem drinkers and those demonstrating efforts to escape alcoholic addiction. However the chapter fails to include a discussion of, or the mention of, the use of Antabuse (Disulfiram) in the institutional treatment of cooperative patients suffering from chronic alcoholism. The most involved subject because of its social offensiveness—Crime and Delinquency—has been expertly and extensively discussed in a separate chapter, which illuminatingly calls attention to the manifold biological and social influences as the latter relate themselves to the problems of delinquency and criminality. The chapter on shock treatment is comprehensive in its description, indications, theories, and methods of implementation of the various modalities of therapy employed through the agency of insulin, metrazol, electrocoma, and combined insulin and convulsive shock. The author has included reference in the present volume to electronarcosis, and to Meduna's Carbon Dioxide therapy. He observes however, that he has "not accumulated sufficient data to feel justified in making a report at the present time." He concludes by advising that "no attempt will be made to present the details of the technique of Carbon Dioxide therapy," suggesting that "anyone interested in administering this treatment . . . avail himself of . . . instructions . . . in Meduna's monograph. . . ." The chapter on Psychosurgery is very well written and well organized, and is an entirely new addendum to the author's present volume. It comprehensively covers the subject, and traces the procedures from their inception down to the most recently evolved neurosurgical techniques. Group Psychotherapy in its several aspects, has been added to, and has been made part of the chapter on socialization.

The text book has undergone its third revision since it first appeared in 1936, and has been considerably enlarged and brought up to existing standards since its previous appearance under its former title of Modern Psychiatry, in 1945.

The volume is written in plain language which should lend itself to easy understanding even by those not yet completely oriented to the nomenclature of psychiatric jargon. The text should prove to be a valuable source of reference for use with material benefit by medical practitioners in allied fields of medicine, as well as by student undergraduates engaged in the study and approach toward a synthetic understanding of psychiatric disorders.

Lewis J. Siegal, M.D.

SYPHILITIC OPTIC ATROPHY. Walter L. Bruetsch, M.D., Charles C. Thomas. Pp. 138. $5.50.

This monograph appears at an opportune time when at last the optimistic statement is permitted "that the time has arrived when blindness due to syphilitic optic atrophy can be prevented. This achievement has been accomplished by the recognition of the early stages of the disease and particularly by the advent of successful treatment methods."

The subject is covered from every angle: Historical background, pathogenesis, pathology, clinical features, and treatment.

Based on a large histologic material of optic nerves in all stages of degeneration, the author has come to the conclusion that so-called primary syphilitic optic atrophy is always due to a chronic inflammatory process, which can successfully be checked by large doses of penicillin. Early diagnosis in suspected cases, which depends chiefly on a close study of the visual fields, holds the key to the elimination of a disease which up to recently has been associated with tragedy.

There is an enormous back-log of patients with late syphilis, being estimated at approximately 10 million adults in this country, many of these having received inadequate or no treatment at all. It is in these individuals where after twenty and more years syphilitic optic atrophy develops, remaining frequently unrecognized until the patient is nearly blind.

The book is short, easily read, and beautifully illustrated. It is of interest not only to the ophthalmologist and neurologist but also to the psychiatrist, because this disease from its early days has been mainly elucidated by physicians working in mental institutions, where optic atrophy occurs as a complication in patients with syphilis of the nervous system.

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